Design of a Filtration Device for Reuse of Residential Waste Water

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Keywords: Waste Water, Residential Waste Water, Waste Water Management, QFD, PDS

Abstract:

It is a well known fact that three fourth of the earth's atmosphere are filled with water. In spite of that Water; food and energy sources are emerging very fast and becoming crucial issues. Most of the river basins in India are experiencing problem to full fill the water shortages, and it is because of the agricultural growth, industrialization and urbanization. Current and future fresh water demand could be met by the water and waste water management. So, waste water/low quality water is becoming as probable source for demand management. Only sixty percentage of industrial waste water, from large scale industries, is being treated. Performance of municipal sewage treatment plants, for treating residential waste water, and common effluent treatment plants, for treating effluent from small scale industries, is also not effective with given standards. So, treated water from the treatment plants, often, is not suitable for household purpose and reuse of the waste water is mostly restricted to agricultural and industrial purposes. However, there are higher risk associated to human health and the environment on use of waste water especially in developing countries, where rarely the waste water is treated and large volumes of untreated waste water are being used in agriculture.

Design process started with a primary research and an identified need of filtration device for residential waste water. Data collection was carried out by adopting methodologies such as literature review, and product environment study. Ethnography and personal interviews was carried out to understand customer needs and aspirations. Quality function deployment and Product design specification were generated based upon data analysis. Concepts were generated with respect to the derived Product design specification and shortlisted by participatory method. Various issues and needs identified through data collection have been addressed in developed concepts. Final concept was selected by weighted ranking method.

A 1:1 appearance model and 1 working model had been made to validate the final concept and test certificates have been taken from laboratory to validate product. Major user needs such as low cost and less maintenance were satisfied by the final design.

Various concepts of filtration device

Final concept

1:1 Appearance model and scaled working model